

The Mechanics, Editing, And Language Of Scientific Documents



Part I – Writing Mechanics

1. Avoiding Common Errors of Grammar When Checking Your Completed Report



One of the most important skills a writer can have is the ability to compose clear, complete sentences. The sentence is the basic unit of communication in all forms of English.

Funk, McMahan, and Day
Elements of Grammar

The Basics Of Report Writing Demand That You Check Your Work!!

Even Though Scientific Reports Completed
At The Collegiate Level Should Be Devoid of
Simple, Grammar School Level Mistakes,
Students Consistently Fail To Take The Time
To Check Their Work For Simple Errors...

The Following Slides Give Common
Grammatical Errors.

- When Checking Your Work, Ensure That...

1. Your Lists

Parallel

Printed circuit board relays are limited to small coil voltages, contact ratings, and lack multi-pole configurations.



Printed circuit board relays are limited to small coil **voltages and contact ratings, and **lack** multi-pole configurations.**

2. Modifiers Are In Their Appropriate Places

These proteins indicate to the body what hormones should be given off among other things.

These proteins indicate, **among other things**, to the body what hormones should be given off.

In meeting the staff of the Parks Department, the greatest problem was that of water leakage.

From the staff of the Parks Department, **we learned that** the greatest problem was that of water leakage.

3. You Do Not Use Unclear Pronoun References Which Could Cause Ambiguities

For Example...

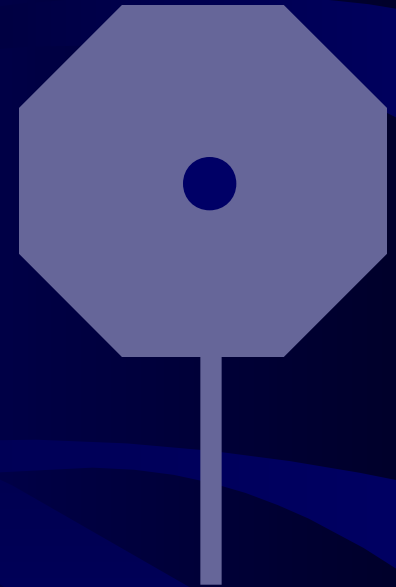


Because the receiver presented the radiometer with a high flux environment, it was mounted in a silver-plated stainless steel container.



In this sentence, the reader does not know what “it” refers to. Is “it” the receiver? Or is “it” the radiometer?

2. Avoiding Common Errors of Punctuation



Punctuation Rules Are Designed To Have Sentences Be Read One Way. Check Out The Rules For The Following Common Punctuations...

Colon: a colon introduces a formal list, long quotation, or definition.

Semi-Colon: a semi-colon either joins two independent clauses (closely linked in thought) or separates complex items in a list.

Dash: a dash acts as a parenthesis to separate items that cannot be separated by commas.

Comma: a comma separates details in a sentence.

The Following Are Examples Of Proper Colon Usage...

We studied five types of marsupials: opossums, bandicoots, koalas, wombats, and kangaroos.

The laboratory growth of this crystal made possible a new astronomical tool: a gamma-ray detector with high-energy resolution.

In formal writing, what is on the left side of the colon should stand alone as a separate sentence.

Once the list ends, the sentence ends.

Although Equations Are Separated By White Space, They Should Be Treated As Part Of The Sentence

To calculate the strain, ε , we used Eq. 1

$$\varepsilon = \frac{\sigma}{E} \quad (1)$$

where σ is the stress estimated by FEPC and E is the modulus of elasticity of aluminum.

Notice That:

1. The Word “Equation” (Eq.) Is Capitalized
2. There Is NO Punctuation After The Equation Or At The End Of The Sentence Above The Equation
3. The Equation Number is Right Justified
4. The Equation Itself Is Centered

Figures, Tables, & Equations...

When Referring To Figures, Tables, & Equations In Your Report, They Should Be Written As Follows....

Singular

Fig.

Eq.

Table

Plural

Figs.

Eqs.

Tables

When Inserting Figures Into A Document, They Should Be Formatted As Follows....



Figure 1. Crew Member Inspecting Loaded F-15E.

Here Are Some Examples Of Dashes In Use...

Because two isotopes of hydrogen—deuterium and tritium—are lightweight, can be produced easily, and require little energy, they are prime candidates to begin the fusion process.

After one year, we measured mirror reflectivity at 96 percent—a high percentage, but not as high as originally expected.



Commas Separate Parenthetical Details...

X-ray backscatter systems, which are relatively inexpensive require the operator's attention.



X-ray backscatter systems, which are relatively inexpensive, require the operator's attention.

3. Avoiding Common Errors of Usage

Choose the right word, not its second cousin. The difference between the right word and the almost right word is the difference between “lightning” and “lightning-bug.”

Mark Twain



Two Common Usage Errors Are Possessives And Subject-Verb Disagreements.

Look At The Following Examples...

The criteria for assessing the environmental effects of acid rain (are / is) given in the next section.

are

So far, the daily number of engineers applying (has / have) remained constant.

has

The goggles protect a (persons / person's) eyes from any damaging effects that a laser could cause.

person's

In accordance with my (boss' / boss's) schedule, the first series of computers was replaced.

boss's

To Decide Upon The Verb Tense In A Document, It Helps To Clearly Lay Out A Time Table...

Past Tense:

Events that
have already
occurred

Present Tense:

Timeless details or
details at time of
reading

Future Tense:

Events that will
occur after project

$t = 0$

t

*The pressure **was**...
For the experiment,
we **assumed**...
As **was shown** back
in Figure 1...*

*Air **is** 79 percent
nitrogen.
Figure 1 **shows**...
The computer code in
Appendix B
includes...*

*Future work **will**
focus on....*

The Verb Tense That You Use Depends Upon It's Location In The Document.

Introduction

This report *presents* a design for connecting light emitting diodes to the HC11 microcontroller.

Look At These Examples

Results and Discussion

...Figure 1 *shows* the circuit that connects the light emitting diodes to the HC11 microcontroller.

Conclusions

This report *has presented* a design for connecting light emitting diodes to the HC11 microcontroller. As *was shown* in Figure 1, the circuit...

Another Thing To Look Out For Is Word Usage, As Certain Words Are Commonly Misused.

Here Are Some Examples...

We produced a small (amount, number) of autos this year, even (fewer, less) than last year.

number
fewer

A company's success depends on (its / it's) employees.

its

The new material is (composed / comprised) of plastic and iodine.

composed

It appears (as if, like) the Department of Energy will choose the third option.

as if

In Addition, Non-words And Nonsensical Groupings Of Words Also Cause Problems.

Whichever design you choose is (alright / all right) with me.

all right

(Irregardless / Regardless) of the shipping delay, the work will stop because of the strike.

Regardless

Applying that set of constraints is a (most unique / unique / very unique) way to approach the problem.

unique

The serum had (alot / a lot) of side effects.

a lot

Finally, The Proper Use of Numbers Depends Upon Context...

When to use numerals

Specific measurements 3 volts, 2 seconds, 1 m/s

Percentages 15 percent

Monetary figures \$3000

Large numerals 5 million

When to write out numbers

Counting (one or two words) twenty-three gages

Informal measurements two hours

First word of sentence Thirty-three...

If The Number is Ten or Above Do NOT

In Summary

- Above All - Take The Time To
CHECK YOUR WORK!!
- Check For Basic Grammatical
Errors And Follow The Rules Of
Grammar, Punctuation, And Usage
That Were Discussed
- To Help Out With Verb Tense
Usage, Set Up A Timeline

Part II – Editing



As With Writing, Before Editing A Document, You Should First Consider Your Constraints

**Audience
of Document**

**My Aero
Report**

**Format of
Document**

**Professor's
Instructions**



**Formality of
Document**

**Other Editors
of Document**

**Politics and
Ethics**

The Three Aspects Of Writing We Previously Discussed Affect The Way That Editors Assess Documents

My Aero Report



Content

Style

Form

1. Editing For Content Involves Deciding What Message To Send...



**Is the
content
APPROPRIATE?**

**Is the
content
CORRECT?**

**Is the
content
COMPLETE?**

2. Editing For Style Involves Deciding How To Communicate The Message

**Focus on
Language**

**Focus on
Structure**

**Focus on
Illustration**

3. Editing For Form Concerns Whether The Communication Is Properly Presented

**Focus on
Punctuation**

**Focus on
Grammar**

**Focus on
Usage**

**Focus on
Format**

**Focus on
Spelling**

A Well-Done Edit Has Three Characteristics: Clarity, Consistency, And Hierarchy

clarity

deletee

consistency

effect
effect
effect
affecte

hierarchy

most
important

next most
important

least
important

When Editing, One Convention Is To Circle Comments, But Not Added Words Or Letters

Last year, city engineers came up
with a plan to address the
tetrachloroethane-contaminated
soil required to be excavated for
planned thoroughfare construction
that will occur within
right-of-way adjacent to Building
1817, which houses the Genetics
Laboratory.

*devised
for*

sentence too long

This construction /

*au**

**au: are you implying that Chem E
contaminated*

In Summary...

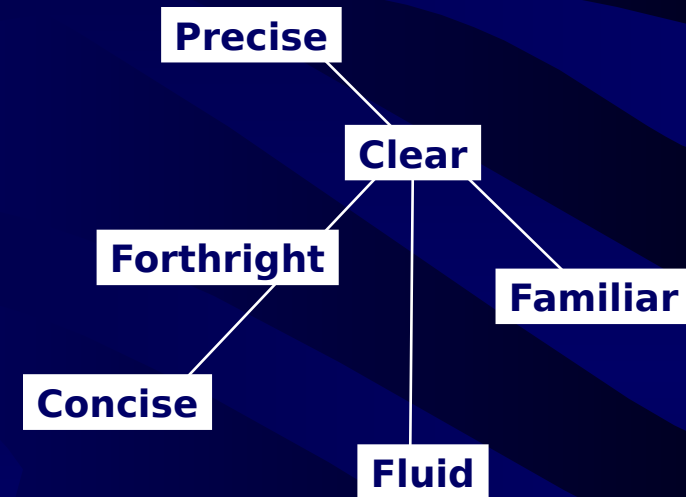
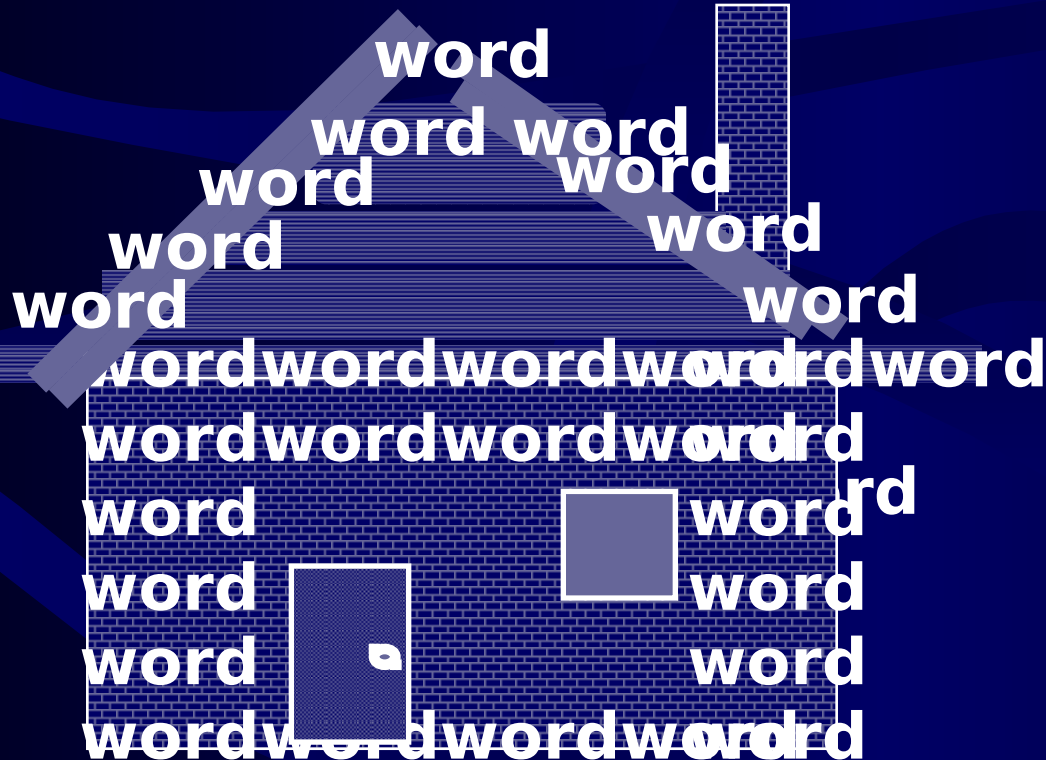


- Consider Your Constraints Before Editing
- Edit For Content, Edit For Style, And Edit For Form
- Maintain Clarity, Consistency, And Hierarchy When Editing

Part III – Language



Your Words Create The Foundation And Structure Of Your Report. Remember to Keep Them...



If You Use Generalities That Are Not Anchored With Specifics, They Are Soon Forgotten

After recognizing some problems with the solar mirrors, we took subsequent

Trash

Contains Specific Instances- Easier To Remember



After finding that high winds (and not hail) had cracked the ten solar mirrors, we began stowing all mirrors in a horizontal position during

For Precise Language, Chose The Best Level Of Detail, But Avoid Over-Specifying

Look At This Example...

The number of particular hydrocarbon combinations in our study is enormous. For example, the number of possible $C_{20}H_{42}$ is 366,319 and the number for $C_{40}H_{82}$ is 62,491,178,805,831.



The number of hydrocarbon combinations in our study is enormous. For example, the number of possible $C_{40}H_{82}$ is more than 62 trillion

Watch Out For Wording That Is Too Complex, Because It Buries Ideas...

This study will consider why current solar energy systems, such as Solar One, have not reached the commercial stage and will find out what steps we can take to make these systems commercial.

R.I.P.

The goal of this study is to develop a commercialization strategy for solar energy systems by analyzing factors impeding early commercial projects (i.e., SOLAR ONE) and by identifying the potential actions that can facilitate the viability of the projects.

When Modifying An Object, Make Sure The Adjectives Do Not Swallow The Idea



Solar One is a 10 megawatt solar thermal electric central receiver Barstow power pilot plant.

→ **Solar One is a solar-powered pilot plant located near Barstow, California. Solar One produces 10 megawatts of electricity by concentrating solar energy in a central receiver design.**

Correct.

In Addition, Complex Sentences Misdirect Readers

The goal of the work was to confirm the nature of electrical breakdown of nitrogen in uniform fields at high pressures and electrode gaps which approach those obtained in engineering practice, prior to the determination of the processes which set the criterion for breakdown in the above-mentioned gas in uniform and non-uniform fields of engineering significance.

This One Is Better...

At high pressures (760 torr) and typical electrode gap distances (1 mm), the electrical breakdown of nitrogen was studied in



An Ambiguity Is A Group Of Words That Can Have More Than One Meaning- Make Sure Your Wording Is **PRECISE**

We examined neat methanol and ethanol and methanol and ethanol with 10% water.

Too Ambiguous



Not Ambiguous

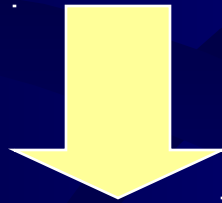
We examined four fuels: neat methanol, neat ethanol, methanol with 10% water, and ethanol with 10% water.



To Tighten Your Writing, Eliminate Redundancies

Vibration measurements made in the course of the Titan flight test program were complicated by the presence of intense high-frequency excitation of the vehicle shell structure during the re-entry phase of the flight.

Much Better!!



Too Verbose!!

Vibration measurements made in the Titan flight were complicated by intense high-frequency excitation of the vehicle shell during re-entry.

Use Examples In Your Writing To Anchor Abstract Generalities

When designing an aircraft, it is important to look at many factors. For example, the aerodynamics, the structures, the propulsion, and the stability and control of the aircraft must all be carefully considered. Each of these elements is an integral part of the design.

Another Key Aspect Of Your Writing Is Sentence Openers. Varying Sentence Openers Allows For More Kinds Of Transitions Between Sentences.



You Can Also Vary Sentence Openers To Vary The Document's Rhythm

- **subject-verb**

**Mount St. Helens
erupted on May 18th...**

- **prepositional phrase**

**In minutes, the mountain
emitted...**

- **adverb**

Recently, debate has arisen


- **dependent clause**

**Although the exact time
of the eruption surprised
scientists, evidence had
been collected...**

- **infinitive phrase**

**To understand the
eruption, we have to...**

Finally, Varying Sentence Openers Enlivens The Writing And Allows Connections Look At The Compiled Example Below...



Mount St. Helens erupted on May 18, 1980. Its slope collapsing, the mountain emitted a cloud of hot rock and gas. In minutes, the cloud devastated more than 500 square kilometers of forests and lakes. Although the effects of the eruption were well documented, the origin is not well understood. Volcanic explosions are driven by a rapid expansion of steam. Recently, debate has arisen over the source for the steam. Is it groundwater heated by magma or water originally dissolved in the magma itself? To understand the source of steam in volcanic eruptions, we need to determine how much

In Summary...

- Choose Your Words To Support The Structure And Foundation Of Your Document
 - Don't Use Generalities
 - Use Precision Language
- Keep Sentences Simple And Unambiguous
 - Use Examples To Support Your Ideas
 - Vary Sentence Openers

QUESTIONS??

